

INITIAL TESTING of Sandia's new vertical axis wind turbine is underway at its East Mesa site. The turbine, as tall as a seven story building, carries egg-beater-like blades 17 metres in diameter. Winds in excess of 10 mph enable the turbine to produce power. Emil Kadlec (5715), project engineer, expects the initial testing to continue for several weeks. A third blade will be added to the turbine later this year.



# LAB NEWS

VOL. 29, NO. 7

APRIL 8, 1977

W76/Mk 4 RB

## Many Sandians Work on New Navy Weapon

A Sandia-developed AF&F (arming, fuzing, and firing) assembly is one of the major components in the Navy's W76/Mk 4 RB (reentry body) which was successfully test flown on March 28 aboard the Navy's Trident C4 Missile.

Three Sandia divisions in the Systems Development Department II 4330 coordinate the efforts of many Sandians in Albuquerque and Livermore and serve as liaison with ERDA and the Navy, with Lockheed (missile prime contractor and developer of the structural and heat shield portions of the RD), and with LASL (developer of the nuclear physics package). Bob Christopher's Mk 4 AF&F Systems Division 4335 has primary responsibility for the AF&F assembly which includes the warhead electronics; Sam Jeffers' Mk 4 Test Division 4336 coordinates the under-

*[continued on page four]*

## New Car Pool Parking System Announced

Effective April 18, the current system of reserved slots for registered car pools will be replaced by a system in which prime car pool parking areas will be reserved for vehicles arriving with two or more people.

The areas reserved for two-or-more-only are, with one exception, the same areas now containing numbered slots. That exception is the area south of Building 832 (personnel), which is now designated one of the two-or-more-only areas. The areas will be marked by signs: RESERVED — VEHICLES WITH TWO OR MORE PEOPLE.

The new system is designed to reduce unused slots in the reserved areas and to reduce Security involvement in the system. Gone, for example, will be the need to register a car pool. If you show up at a parking lot with at least one other person in your vehicle, you're a car pool. If not, you're not.

Car poolers under this new definition need to be warned of two things. First, since you won't have a numbered slot reserved, you may occasionally have difficulty finding space in the reserved lots just before 8 a.m. (If a lot proves consistently overcrowded with two-or-more occupant arrivals, more space will be added as necessary.)

Second, it will be the responsibility of poolers themselves to protect the integrity of the system. From a national point of view, car pooling is desirable and Sandia will support it with facilities identified for car pooling. Commuter energy conservation, at this point, is a social concern and should be handled as such.

## Supervisory Appointments

**JON REUSCHER** to manager of newly-created Reactor Development and Applications Department 5450, effective March 16.

Since January 1974 Jon has headed Reactor Design and Development Division 5424 and Reactor Source Applications Division 5421. He joined Sandia in January 1965 after earning his PhD in nuclear engineering from Texas A&M University. He has been engaged in fast burst reactor design, reactor applications and, for the past three years, in the upgrade of Sandia's Annular Core Pulse Reactor. The core is being redesigned to improve performance as part of the safety studies program on the liquid metal fast breeder reactor.

Jon is a member of the American Nuclear Society and Sigma Xi honorary. After hours, he enjoys gardening, wood-working and photography. He and his wife Betty have two daughters and a son. They reside at 7508 La Madera NE.

\* \* \*

**RON POPE** to supervisor of Transportation Safety Technology Division 5433, effective March 16.

He first joined Sandia in June 1968 after work at NASA Ames Research Center during which he earned his Masters degree in ME from Stanford. He holds a Bachelors in ME from the University of Utah.

He performed aerodynamic studies on the SPRINT missile system and worked on vulnerability and aerodynamics for the Mk 4 program. He also helped in the initial proposal for the Labs' total solar energy program.

Ron left Sandia in November 1973 to work as a senior engineering specialist for Garrett AiResearch.

He returned to Sandia in June 1975 to perform thermal studies relating to shipping casks for spent nuclear fuel.

He is a member of the American Nuclear Society and ASME.

After hours Ron enjoys camping, fishing and hunting. He is active in church affairs. He lives with his wife Sydna, a daughter and a son at 3804 Camino de la Sierra NE.



**NEW SUPERVISORS** — Jon Reuscher (5450), standing, Don McBride (1334) and Ron Pope (5433), right.

**DON McBRIDE** to supervisor of Experimental Aerodynamics Division 1334 effective April 1.

He joined Sandia in March 1969 after earning a PhD in Aerospace Engineering from the University of Michigan. He holds a bachelor's degree in mechanical engineering from General Motors Institute and a Masters in Aerospace Engineering from the University of Michigan. He worked two years for Buick's Engineering Division in the early 60's.

At Sandia Don has performed studies on ablation theory for nose tips and heat shields and general reentry vehicle protection.

He is a member of IAA, Supersonic Tunnel Association and Sigma Xi honorary.

Leisure activities include golfing, sailing, camping and work on his home at 41 Rock Ridge Drive NE. He and his wife Julie are the parents of a six-week old son, another son, 6, and a daughter, 4.

### Copier Usage Study

A two-week study of copy machine usage will be undertaken from April 11 to 22. During this time, copier users are asked to complete the simple log which will be at each copier location. Only a few seconds of time are required.

On the two Fridays of the study period, each user will also be asked to complete a short, preaddressed questionnaire. Both logs and questionnaires are anonymous and are intended solely to obtain usage rates and user evaluations as part of a larger study of paperwork and copying requirements.

Please be conscientious about filling out the log. Complete and accurate inputs are needed to ensure that individual copying requirements are fully determined.

### LAB NEWS

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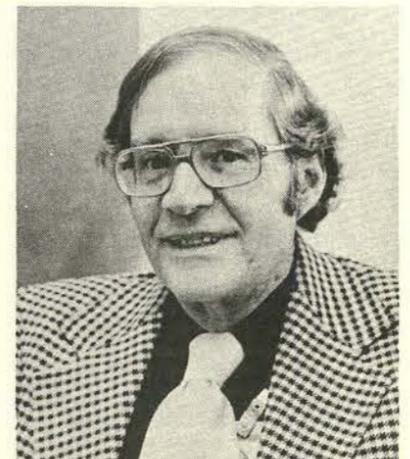
*lorena schneider reports on livermore*



**Ed Haut (4322)**



**Pat Liguori (2533)**



**John Southwick (2551)**

### Retiring

## Systems Vs. Saboteurs

A Sandia Albuquerque-Livermore team is developing ways to evaluate the effectiveness of various physical protection systems for nuclear materials. The team, coordinated by Rob Rinne (8321), has prepared a program which will be used by the Nuclear Regulatory Commission (NRC) to develop licensing regulations and by the nuclear industry in designing physical protection systems for facilities and for transportation operations.

Sandia Albuquerque is working on fixed site physical protection systems for reactors, reprocessing plants, fuel fabrication facilities, and waste disposal facilities. Leon Chapman (5741) heads this effort. Sandia Livermore is concerned with the protection of special nuclear material while in transit; Rob Rinne heads this project. The combined projects are presently funded at a rate of approximately \$3 million per year by the NRC.

Sandia's skills and experience in systems analysis and operations research are being applied to the task of developing the appropriate evaluation methodology. Overall physical protection system effectiveness depends upon the strengths and weaknesses of alarm systems, guards, barriers, closed-circuit TV assessment systems, high reliability communications equipment, and many other components. The key questions are 1) what is the appropriate mix of these components for a particular application and a defined range of adversary capability, and 2) how can a physical protection system be evaluated to determine its composite effectiveness?

And how does one go about defining the methodology needed to assess a complete system? Leon states, "We must develop a comprehensive set of evaluation techniques if we are to come up with the answers we, the NRC, the nuclear industry, and our entire society need in understanding how to protect against nuclear material thieves or saboteurs. The problem is, of course, greatly complicated by the human element. Guards can be trained, but predicting what they would do under the pressure of a well-armed assault team is extremely difficult."

"Even more difficult are predictions about the behavior of a thief or saboteur. Rather than second-guess an adversary, we base our performance measures on what we call an adversary action sequence (AAS) — the series of steps that anyone, armed or not, trained or not, would have to follow to gain access to nuclear material."

The definition of AAS's varies with the nuclear site or the mode of transportation. But the definition of a number of AAS's can serve as input to a computer simulation program. The desired result is a series of computer-generated scenarios which can be analyzed to indicate the performance of an exemplary protection system for a given purpose and, by extension, to determine weaknesses and strengths of any other protection system.

Rob Rinne sums up the program: "Due to the unquantifiable nature of the

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**PRINCIPALS** in Sandia's program to develop ways to evaluate the worth of various physical protection systems for nuclear materials: Rob Rinne (8321, left) heads the combined Albuquerque-Livermore program and coordinates the Livermore end; Leon Chapman (5741) coordinates the Albuquerque effort; and Bill Murphey, the program manager and Chief of the Technical Support Branch, Division of Safeguards, Fuel Cycle and Environmental Research, of the Nuclear Regulatory Commission, for whom the study is being performed.

problem, no model will be able to completely predict system performance. However, we expect that we will provide analytical tools that will significantly assist in assessing the impact of protection strategies, in evaluating licensee submit-

tals, in designing systems, and in determining system status. In particular, these methodologies may play an important role in helping the nation decide the future for recycling plutonium in light water reactors."

## Dick Finn Encourages Recycling of Waste Oil

Volunteer Dick Finn (8432), committee member for the Livermore Community Recycling Center, reports that waste crankcase oil, kerosene and paint thinner are now being accepted at the center in addition to glass, cans and newspapers.

Dick says that bringing used oil in makes sense because it can be easily cleaned up and reused. "Besides conservation," he notes, "there are anti-pollution benefits, since oil dumped on the ground or down a drain eventually finds its way into water tables, streams and oceans. It's estimated that two-thirds of oil pollution in the world's oceans comes from drain oil and machines. Pouring oil down a drain can also cause damage in sewage treatment

plants by attacking the bacteria in the treatment process."

Donors are asked to bring contributions to the center in containers which volunteer workers will empty and return.

Located by The Barn on Pacific Avenue behind the Livermore Library, the recycling center is open from 10 a.m. to 4 p.m. every Saturday.

## Solar Conference Tours at SLL

Over 2000 members of the Northern California Solar Energy Association toured the solar experimental area at Sandia/Livermore during a recent day-long conference on local solar energy research. As the largest single chapter of the American Section of the International Solar Energy Society, the group represents a spectrum of academic, commercial and individual interests in solar energy.

Sharing in the program portion of the conference were Sandia host Tom Brumleve (8184) and Taz Bramlette (8313). Tom discussed the central receiver project and Taz covered ERDA's thermal energy storage activities.

Following the program and a visit to LLL's shallow solar ponds, participants toured Sandia's solar test facilities.

## Sandia Participates in Job Fair

Sandia/Livermore was among the participants in a recent Minority Professional Job Fair held at UC-Berkeley under the sponsorship of the school's Career Planning and Placement Center. The fair was devoted to job possibilities available in industry throughout the Bay Area.

Representatives from over 85 companies participated. Representing Sandia were Gertrude Williams, EEO and Women's Coordinator at SLL (8212), and Rocky Bridges, an electrical engineer in Electronics Development Division 8159.

## Many Sandians Involved in New Navy Weapon System

ground, laboratory, and flight tests necessary to prove the system; and Ben Bader's W76 Development Division 4337 handles system integration — "which includes all the stuff that can fall between the cracks," says Ben.

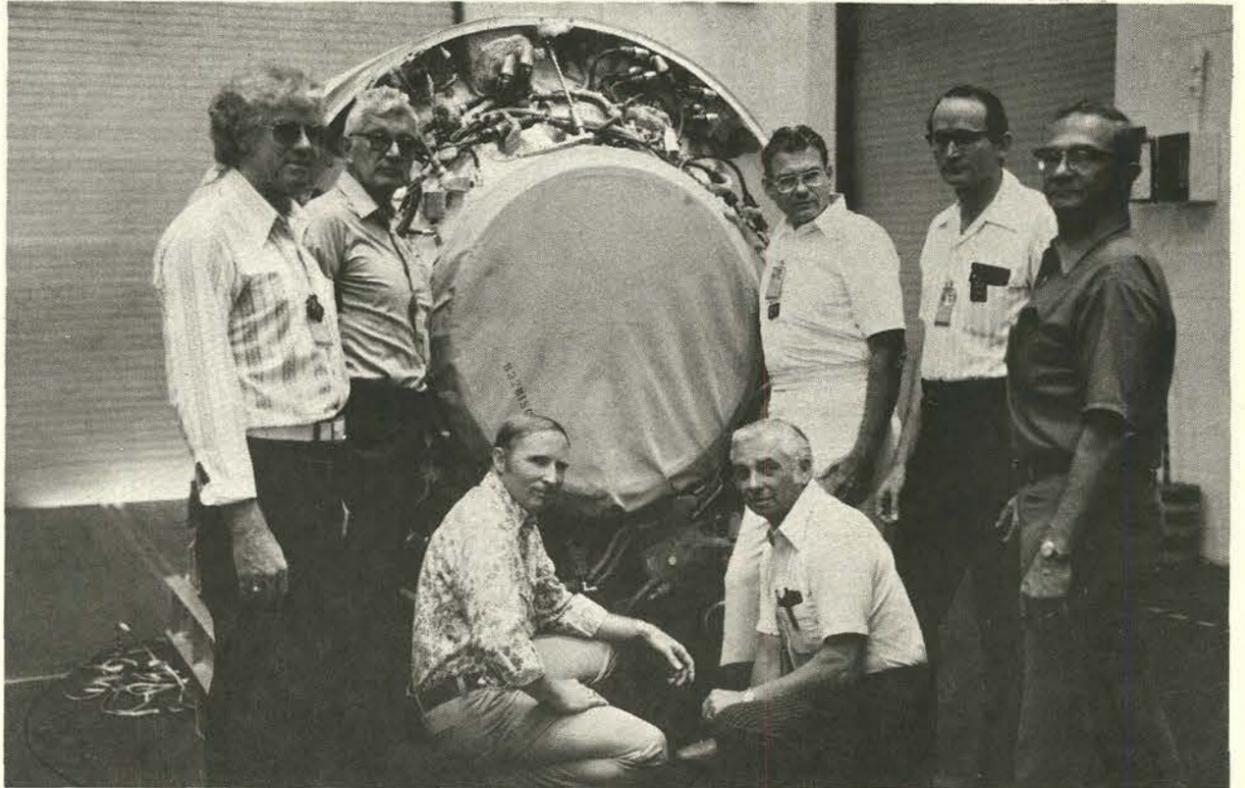
Trident is the Navy's newest strategic system; it's a sophisticated weapon system with ICBM range and multiple target capability. The arming and fuzing system provides five fuzing options with backup capabilities for each RB. Engineering development was authorized in April 1973, and the first production unit is scheduled for early 1978.

The Trident missile was successful in its first two flight tests from Cape Canaveral in January and February. The March test was the first to have the Sandia/LASL-developed components aboard. "Our underground and laboratory tests were very successful," says Sam. "For the flight test we replaced the nuclear package with a telemetry package developed by Stu Ingham's Instrumentation Applications Division I (9481) so we could get the data necessary for flight evaluation."

"The all-solid-state radar fuze is the most significant technology advance in the AF&F assembly," says Bob. "Developed by Ray Alls' Electronic Development Division 2121, it contains 52 Sandia-developed universal digital integrated circuits mounted with other components on hybrid microcircuits to produce a highly reliable and accurate radar with a short warm-up time and a weight of less than 1.5 pounds.

"Another complex electronic component is the timer, the brain of the system. It contains 19 integrated circuits, and it too is small compared to earlier timers. It's the timer, developed by Jim Baremore's Integrated Circuit Applications Division 2132, that gives the RB its versatility. The timer has a small core memory that stores submarine prelaunch commands and calls up the desired fuzing option at the appropriate time in the trajectory."

Much of the Mk 4's remaining componentry is a modified version of the Mk 3



**LAUNCH SITE TEAM** at Cape Canaveral with the Trident missile which carried Sandia-developed flight components and monitoring equipment. From left, Lockheed missile engineer Red Fulcher, Bill Poole (9414) of the ground station crew, flight test engineers Larry O'Connor and Bob Clay (both 4336), Sandia's Eastern Test Range resident representative Bob Pace (9414-4), telemetry engineers Don Argyle and Al Marris (both 9481).

componentry used on the Poseidon. "Sandia did a good job on the Mk 3," says Bob. "That's why, although arming and fuzing is normally a DoD responsibility, we were asked by the Navy to arm and fuze the Mk 4 as a fully reimbursable effort. We are using carry-over Mk 3 technology as much as possible, modifying components as necessary to meet Trident system requirements. The launch accelerometer and the reentry decelerometer, for example, have had new safety features added."

"We're proud of the Mk 4," says Ben, "because we believe we've succeeded in holding to our basic philosophy — to develop a weapon with an acceptable level of reliability *at a reasonable cost*. We avoided the temptation to innovate for the sake of innovation. Right from the start, we've concerned ourselves less with new developments than with assuring a smooth path to production. We're slightly under our 1973 cost predictions. We're proud of

that too — especially since the W76/Mk 4 program is the first Sandia involvement in a weapon ever to be regularly audited by GAO."

As with any major development program, hundreds of Sandians at Albuquerque and Livermore have contributed significantly to the development task. At Livermore, one major tactical component was developed by Engineering Division 8332 under John Marion, and part of the flight instrumentation componentry was developed by Post Development Testing Division 8181 under Bob Tockey.

Says Herman Mauney (4330): "We've had excellent support from Sandia organizations, and the wide variety of talent we've been able to tap is one major reason that our progress has been smooth. Another major reason is that we've had good interagency cooperation — in fact, working with the Navy, Lockheed, and LASL has been a real pleasure."



**W76/Mk 4 PROGRAM** demanded close Albuquerque-Livermore cooperation. Here Cook Story (8332), SLL's design engineer responsible for a major warhead component, examines drawing held by Casey Brown (4337), who handled liaison with Livermore and LASL.



**IMPACT FUZE** for the Mk 4 AF&F was designed by George Clark (left) of Firing Subsystems Division II 2314. Don Tipton (4335) coordinated the system requirements for the component.

# Howie Mauldin Achieves 'Breakthrough' In Electrical Capacitor Performance

Capacitors are vital parts of any weapon electrical system. In the critical firing system they store large amounts of electrical energy and release it quickly to initiate the explosive process. The technology of capacitors has remained relatively stable for many years. Although research and development activities continued, it appeared that the limit of performance had been achieved.

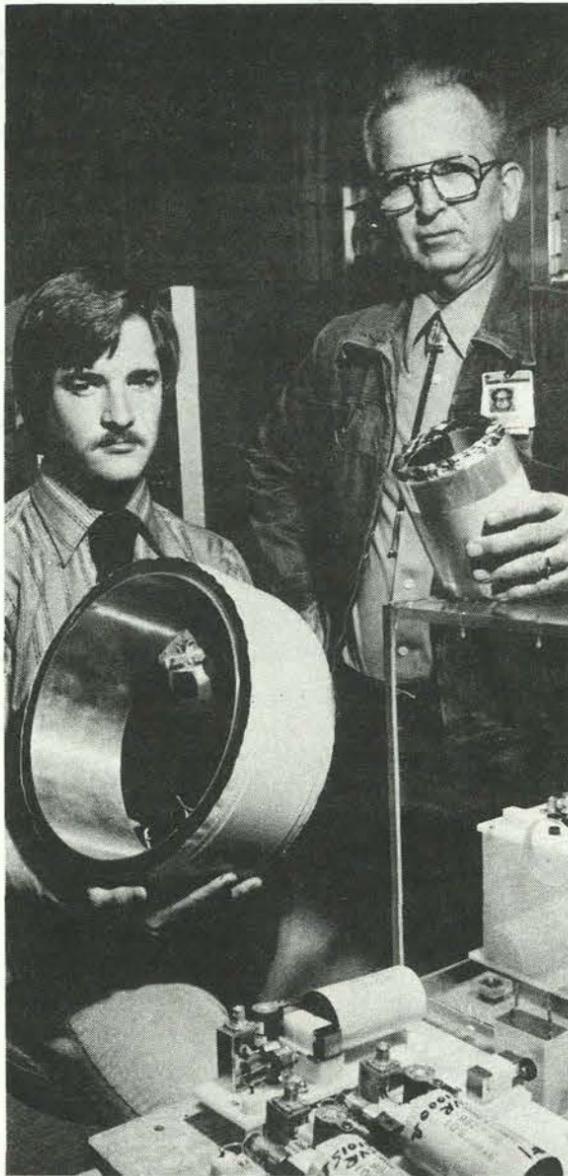
Howie Mauldin of Physical Design and Materials Division 2316 has changed all that.

Howie has demonstrated a new capacitor design that is seven to nine times more powerful than designs of the same size and weight, using Sandia's current technology. Additional improvements are envisioned, and energy gains of 10 to 12 times present technology appear feasible.

Basically, a capacitor is a long sandwich of thin conducting foils, such as aluminum, separated by a thin layer of dielectric material. This long sandwich is wound in a tight spiral to accomplish the familiar cylindrical configuration. With a given dielectric material, the energy storage capability is a squared function of the operating voltage stress. For example, twice the operating voltage stress produces four times the energy. The high ultimate electrical strength of plastic films such as mylar has long tempted workers in the energy storage capacitor field. This ultimate strength suggests the possibility of operating at high voltage stresses. This ultimate performance has never been fully achieved in practice because trapped air pockets and other irregularities in the winding cause widely varying electrical breakdown levels. Because of this, in electrical systems requiring high reliability, the capacitors must be underrated against ultimate performance to assure reliable performance. In other words, capacitors that are larger than desired must be used to ensure reliable performance.

Howie has introduced a unique impregnating agent — a liquid perfluorocarbon — into the capacitor winding. This family of electronic liquids is a descendant of such common hydrocarbons as butane which have undergone an exchange of fluorine atoms for all of their hydrogen atoms. They possess a number of unique physical and electrical properties which highly recommend them as impregnants for capacitor windings. They have low surface tensions which cause effective wetting of other materials. Low surface tension coupled with low viscosity cause them to penetrate and protect capacitor windings completely. The perfluorocarbons have significantly higher dielectric strengths than conventional impregnating liquids and remain liquid over a wide temperature range — from -65°F to 320°F.

The capacitors are impregnated with the perfluorocarbon after soaking at hard vacuum levels to remove all trapped air and other contaminants in the winding. Following this, the assembly is subjected to a medium vacuum environment to remove air that might be trapped in the perfluoro-



**DRAMATIC DIFFERENCE** in capacitor technology is demonstrated by Gary Webb, holding conventional capacitor, and Howie Mauldin (both 2316), holding newly developed capacitor with perfluorocarbon impregnating agent. Both capacitors have the same rated output.

carbon. The capacitor winding is then hermetically sealed to maintain this near perfect electrical environment.

"What we have," Howie says, "is a capacitor that will reliably perform closer to the ultimate electric strength of its dielectric material. The impregnant and processing have significantly stabilized the electrical performance. In practical terms, it means that much more energy can be stored in a given space while maintaining the required performance reliability."

The capacitor work is only the beginning of proposed applications of the perfluorocarbons to electrical systems.

"The liquids were originally developed as coolants and test beds for demanding electrical systems," Howie says, "but as high dielectric strength insulators which perform over a wide temperature range, they are being evaluated as replacements for hard potting materials in the high voltage portions of electrical systems. We can foresee size reductions comparable to those achieved in the capacitor by this means. The possibilities are intriguing."

Howie, a weapons pioneer, worked in weapon radar design and adaptation at LASL during World War II. After a brief period away, he returned to Sandia in 1949 and has since been engaged primarily in research and development of weapon firing systems. He is assisted in the capacitor development work by Gary Webb (2316).

## Workshop Offered Secretaries, Office Workers

A special one-day workshop for secretaries, office workers, business teachers, and students, entitled "Happiness is . . . Self-Development," will be presented by the Albuquerque Chapter of the National Secretaries Association on Saturday, April 23, at the Albuquerque Convention Center. The program, to be conducted by two past International Presidents of the National Secretaries Association, is designed to increase the effectiveness of secretaries and office workers at all levels.

The In-Basket Technique, How to Handle Environmental Relationships, The "RC" Factor, Case Problems, and How to Develop Initiative, Self Assurance, and Leadership will be covered. Many company training directors have found this program to be of great value to employees.

Registration begins at 7:30 a.m., and the program concludes at 4:00 p.m. The registration fee, including luncheon, is \$13.50. Students may attend for \$10.00. Reservations: June Rugh (4110), CPS, at 4-9272.

## A Matter of Degree

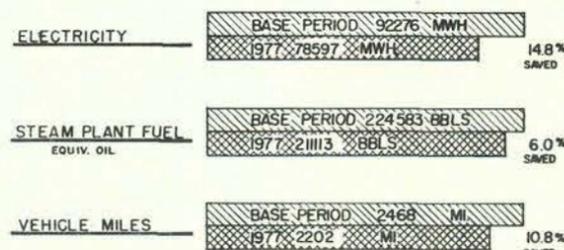
Congratulations to the following, who received academic degrees during the last quarter: PhD's — Dale Berg (1334) and Bruce Hansche (9352); MS/MA's — Angie Montoya (1233), Mark Schaefer (1244), Lyndon Pierson (2648), Michi Wada (2142), Floyd Braaten (3622) and Etta Moore (3433); BS's — Earl Morris (9524).

## Events Calendar

- Through April* — "Divorce Me Darling," Barn Dinner Theatre, 281-3338.  
*April 9* — "Call Me Madam," KHFM, 96.3 FM, 6:40 p.m.  
*April 12* — UNM Symphony Orchestra, Rodey Theatre, 8:15 p.m.  
*April 16, 17* — N.M. Mt. Club tour of Chaco Canyon, 268-4771.  
*April 17* — Concert by Gene Ives, First United Methodist Church, 4 p.m.  
*April 18* — "Death Valley — Land of Contrast," Audubon Wildlife Film Series, Popejoy Hall, 7:30 p.m.  
*April 19 - May 15* — "7 Year Itch," Ole Henry's Dinner Theatre, 293-5060.  
*April 20* — "Modern Jazz Quartet," New Mexico Symphony Orchestra Benefit Concert, Kiva Auditorium, Convention Center, 8 p.m.

### ENERGY SAVINGS

COMPARED WITH USAGE IN BASE PERIOD - JULY 1972 THRU JUNE 1973  
 CURRENT REPORTING PERIOD ENDING FEB '77



## Take Note

The Jim Kennedy (2513) family is featured on Channel 5, Monday the 18th, in the national documentary entitled "Six American Families." According to Jim, each one-hour show focuses on a single family, the object being to reveal life styles of a wide range of American families. The families selected represent different geographic, ethnic and work backgrounds. Jim says the Kennedys represent a middle-class white-collar family with a handicapped child. The TV series started last Monday and runs every Monday evening at 8 p.m.

\* \* \*

Representative Robert Daniel from Virginia and the House Armed Services Committee was a recent visitor to the Labs. The Congressman was here over a two-day period and was briefed on Labs programs by President Sparks, Bob Peurifoy (4300), Bill Spencer (2100), Orval Jones (1700), and Al Narath (5000). Mr. Daniel is the second Congressman Daniel to visit Sandia within a month; a week earlier Congressman Dan Daniel, also from Virginia, visited Sandia for the same purpose.

\* \* \*

Quality Engineers and Manufacturing Engineers who wish to register as professional engineers in the state of California may still do so without written examination provided that "... the applicant meets all requirements of the Code and provides evidence of nine years or more of qualifying experience." Quality Engineers have until Oct. 1 of this year and Manufacturing Engineers until Jan. 1, 1978, to gain this registration without written examination. For forms and further information write to: State Board of Registration for Professional Engineers, 1006 Fourth St., Sacramento, Ca. 95814. (Note: this State Board has recently recognized and defined the discipline of Ceramic Engineering.)

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ERDA and the Univ. of California have completed negotiations for five-year extensions of contracts for operation of LASL, LLL, and LBL. The present contracts expire on Sept. 30. The agreements continue a relationship with U. of C. begun in January 1943, when the first contract was signed with the Army Corps of Engineers for operation of LASL as part of the wartime Manhattan Engineer District. The three labs together employ about 14,000 people.

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John Andersen (5433) was host last week to the dozen members of the Ad Hoc Committee on Air Transport of Plutonium of the National Academy of Engineering. The Committee reviewed the Labs' plutonium accident resistant container (PARC) program and had an opportunity to witness a PARC crash test in Coyote Canyon. PARC is designed to withstand forces of impact resulting from an aircraft crash.



**MUSIC WITH LUNCH** — That's what will be offered to Sandians next Tuesday, April 12, when the New Mexico Symphony Orchestra Chamber Players come to the Labs and perform in the gazebo near the Tech Library. Bring your lunch, relax in the sun and listen to the music. Program begins about noon.

Diabetes and its control by electronics is the subject of a talk by David Schade of the UNM Med School and Bill Spencer, Director of Microelectronics 2100, at the next dinner meeting of IEEE and ASM. The two speakers will describe joint research to produce an implantable electromechanical device to control diabetes, much as the pancreas does in a nondiabetic person. The Polynesian buffet, at \$5.10 per person, will be served at the Kirtland West O-Club at 7:15 p.m. on April 13. Cocktails at 6:30, speakers at 8:15. Reservations by April 12: Dick Adams, 4-6139 or Fred Yost, 4-6472.

\* \* \*

Want to be a cop — part-time? APD is now accepting applications for its upcoming police reserve cadet class. After completing 155 hours of classroom training and 80 hours of on-the-job training, the Reserve Police Officer has the same law enforcement authority and responsibilities as the regulars while on duty. When commissioned, he or she is assigned as the second person in a patrol car and, each month, works at least one 8-hour shift on patrol and attends 8 hours of in-service training. Reservists are unpaid. Contact Officer David Heshley, 766-4562, if you're interested.

\* \* \*

Eric Jones (5214) reports that Senator Harrison Schmitt is the featured speaker at the next meeting, April 13, of the New Mexico chapter of the Laser Institute of America. The Senator's topic: Energy and New Mexico. The meeting starts at 8 p.m. in the Coronado Club, with refreshments being served at 7:15. Because of the general nature of Senator Schmitt's talk, non-members as well as members are invited to attend.

\* \* \*

The New Mexico Symphony Orchestra & Chorus performs Beethoven's monumental *Missa Solemnis* on Friday and Saturday, April 15 and 16, at 8:15 p.m. in

Popejoy Hall. Tickets are available at Popejoy or at the Symphony office, 120 Madeira NE.

\* \* \*

The April 22nd meeting of the New Mexico section of ASME will be held in the Wyatt Cafeteria banquet room in Coronado Center. Sandia's Jack Hueter will speak on "Engineering Careers — Present and Future." During the meeting awards will be made to students and to senior mechanical engineers. Reservations for the 7:30 p.m. buffet, at \$3 per person, can be made with Tom Feldman, 277-6313, or Fred Norwood, 4-3306.

\* \* \*

If your civic, church, or service group would like a sound-and-slide show entitled "Buses, Cars, and Air to Breathe," call Harry Davidson at 766-7432. The 20-minute show can be augmented by a question-answer session on its subject, Albuquerque's air pollution, traffic congestion, and energy consumption problems. It's a good preface to a May 3 symposium on the transportation alternatives available to the city and its citizens. More details on the symposium next issue.

\* \* \*

The Neighborhood Drama Project's next work is described as "a science-fiction musical for children." Entitled "Snore Trek" and written/directed by Gary Shepherd (2634), the play offers "visits to the planet of Backwards (where everything is the reverse of Earth), Plantonia, where everyone, naturally enough, is a plant, or Catonia, where folks just can't go to sleep." Sound familiar? Performances: Apr. 15, 1:30; Apr. 16, 2:30 and 7:30; Apr. 17, 7:30 at the Baptist Neighborhood Center, 1021 Edith NE, 247-2552.

\* \* \*

David Benson (5167) will present "A Review of High Temperature Vaporization in Uranium Dioxide" at the Weekly 5100 Seminar on April 12 at 3:15 p.m. in Bldg. 806, Room 201.

# Simple, Serviceable, and Solar

When Doug Bruce first considered solar heating for his workshop, he almost gave it up — too complex and too expensive, what with the need for a few tons of rocks or several hundred gallons of liquid for heat storage. "Then," says Doug, "I came to my senses. I realized that the beauty of retirement (he left in '74) is that I could use days, rather than nights, for puttering. Heating at night wasn't necessary at all." Thus began Doug's simple solar space heating system — daytime only, thank you.

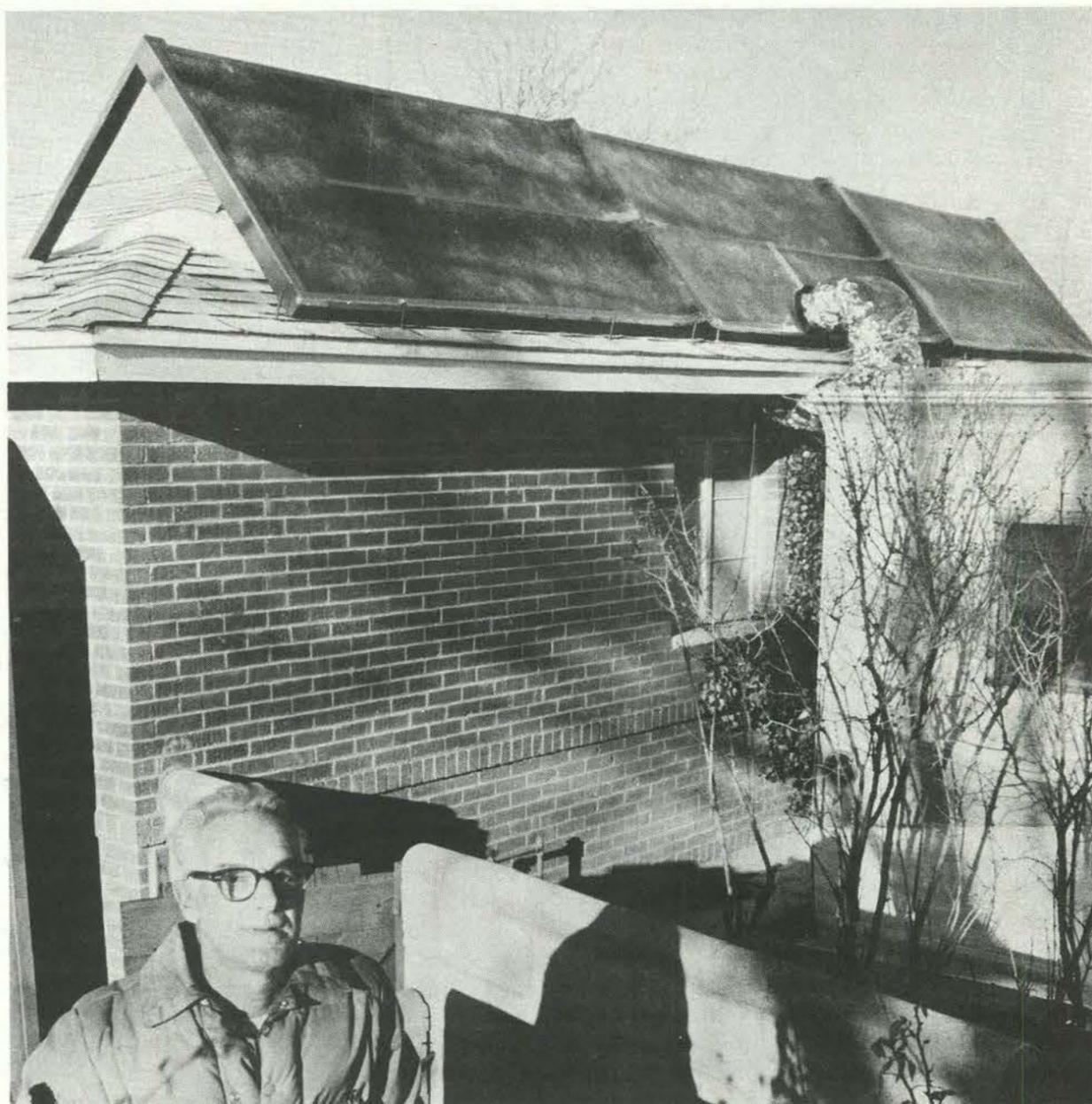
Each of the three collector panels (each 4' x 8') is a sandwich: a 3/8" plywood base, 1" urethane and 1/2" insulation sheathing ("beaverboard") for reducing heat transfer through the back of the collector, standard steel corrugated roofing coated with a special black paint, a 2" air space partitioned to make a tunnel through all three collectors and, finally, 1/16" translucent fiberglass for the top of the collectors.

Doug chose fiberglass even though glass transmits 95 percent of the radiant energy to fiberglass' 89 percent and costs about the same. "Fiberglass is much easier to work with, and it withstands damage better."

The collector array faces 143° from north because Doug wanted to catch the morning sun earlier — and because that happens to be the workshop orientation. The array is tilted at 50° from the horizontal, the best angle for catching the winter sun at this latitude (35° north).

In operation, a bathroom exhaust fan pulls air from the workshop into a 6" duct and discharges it into the three joined collectors. As it passes through 46 1/2 feet of airspace in the array, the air is heated before returning through another 6" duct to the workshop.

Results? "Just fine," reports Doug back in January. "I keep records of temperatures outside, in the workshop, and in the heating duct. When I turned it on at 8:30 this morning it was 20° outside and 49° in the workshop. Between 11 and 1 when the sun strikes the collectors most directly, the



**SIMPLE SOLAR COLLECTOR** adorns Doug Bruce's workshop roof. Air is heated to more than 140° as it travels through 46 1/2 feet of collector.

collector air temperature reached 144°, and the workshop temperature was 64°. On November 28 when the midday temperature was 18°, the collector air still reached 136°, 10° warmer than heat from my furnace."

Doug would be first to admit that a two-car garage-become-workshop is not ideal for retaining heat: one wall is mostly

garage doors, another is minimally insulated brick. He intends to insulate both walls next summer. (The other two walls are against the house.) But he's well satisfied with the performance of his system: "The fan pulls about 1/25 as much power as the electric heater I used to use, inside temperatures are just as warm, and total cost of materials was only \$282." •bh

G. Yonas (524), "Particle Beam Fusion Program at Sandia Laboratories," Accelerator Technology workshop, Jan. 25-27, LLL.

D.W. Schaefer (5814), "Dynamics of Macromolecules and Microorganisms," Dept. of Biophysics, UNM, Jan. 27.

P.J. Modreski (5832), "Metal-lava Reactions and Related Experiments on Molten Rock," Geoscience Seminar, Jan. 28, LASL.

S.V. Asselin (5412), "Nuclear Safety Considerations in Reactor Plant Design," Civil Engineers Club, Feb. 2, UNM.

J.S. Pearlman (5214), "Diagnostics for Dense Plasmas," Physics International, Feb. 2, San Leandro, Calif.

M.R. Madsen (1752), "The Role of Access Denial in a Security System," System Safety Society, Feb. 9, KAFB Officers Club.

D.E. Mitchell (2513), "The Shock Initiation and Performance of Hexanitrostilbene (HNS) High Explosive," WX-7 Group, Feb. 10, LASL.

D.B. Hayes (2513), "Kinetics of Shock-Induced Polymorphic Phase Transitions," National Bureau of Standards - Heat Division, Cryogenic Physics Section, Feb. 14, Washington, D.C.

D.M. Mattow and R.R. Sowel (both 5834), "Kr<sup>85</sup> Autoradiography for Nondestructive/noncontaminating Surface Porosity Measurements," Southeast Section AVS, Feb. 14-16, St. Petersburg, Fla.

P.H. Holloway (5825), "Surface Analysis of Deactivated Coal Liquefaction Catalysts," 6th Annual Symposium on Applied Vacuum Science & Technology, Feb. 14-16, Tampa, Fla.

R.G. Kepler (5810), "Organic Molecular Crystals," Fifth Latin American Symposium for Solid State Physics, Feb. 14-15, Lima, Peru.

H.D. Garbin (1152), "Laser Strain Meter Measurements at Sandia Laboratories," NMIMT, Feb. 15, Socorro.

C.W. Jennings (2153), "Effects from Electrolytic

## Speakers

Currents on Electronic Circuitry," Bendix Technical Seminar, Feb. 15, Kansas City, Mo.

P.H. Holloway (5825), "Oxidation Stress Corrosion Cracking of U-4.5 Wt.% Nb," SUBWOG 12 B, Feb. 16-18, St. Petersburg, Fla.

E.J. McGuire (5211), "Born Approximation Electron Ionization Cross-Sections"; G.J. Lockwood (5232), J.M. Hoffman (5212) and G.H. Miller (5216), "Charge Transfer Measurements for He<sup>2+</sup> in H and H<sub>2</sub>," Topical Conference on Atomic Processes in High Temperature Plasmas, APS, Feb. 16-18, Knoxville, Tenn.

J.K. Rice, J.R. Woodworth (both 5216) and A.K. Hays (5215), "Power Conditioning for the Production of Group VIA <sup>1</sup>S Atoms," 7th Winter Colloquium on Quantum Electronics, invited paper, Feb. 16-19, Park City, Utah.

J.W. Reed (5443), "Energy Storage Needs for Wind Power Systems"; L.F. Shampine (5122), "Software for Ordinary Differential Equations" 1977 Annual meeting AAAS, Feb. 20-25, Denver.

P.L. Walter (9486), "Measurement Activities in Support of the Nuclear Weapons Program at Sandia Laboratories," meeting of Central Arizona Section, ISA, Feb. 22, Phoenix.

E.J. Graeber (5822) and B. Morosin (5154), "Crystal Structure of [N(CH<sub>3</sub>)<sub>4</sub>]<sub>6</sub>Nb<sub>10</sub>O<sub>28</sub>·6H<sub>2</sub>O"; B. Morosin and P.S. Percy (5112), "Structural Studies on a Radioactive Waste Solidification Process"; D.S. Ginley and M.A. Butler (both 5154), "Structural Aspects of Materials for Photoelectrolysis of Water," American Crystallographic Association Asilomar Meeting, Feb. 21-25, Asilomar, Calif.

K.J. Touryan (5620), "Seven Schemes for Aerodynamic Separation of Isotopes"; R.L. Fox and R.R. Eaton (both 5261), "Numerical Technique for the Analysis of Aerodynamic Isotope Separation Devices"; J.E. Schirber (5150), "Technique for Relativistic Ferromagnetic Band Structure Calculations," American Physical Society Meeting, Feb. 7-10, Chicago.

## ERDA Comments on Carter Budget, DOE Proposal

[Ed. Note — A recent issue of "ERDA News" carried two articles on subjects of interest to Sandians; they are reproduced below.]

ERDA's Conservation program budget is doubled while funds for the Liquid Metal Fast Breeder Reactor are cut substantially under the Fiscal Year 1978 revised budget submitted to Congress by President Carter late last month.

The revised figures total \$7.75 billion in budget authority (the authority provided by law to enter into obligations), an \$87 million decrease from the budget proposed by the Ford Administration earlier in January. The total compares to \$6.39 billion in FY 1977. In outlays (estimated expenditures) the totals are \$6.42 billion in 1978 and \$5.38 in 1977.

The \$200 million slice from the LMFBR authority, dropping the total from \$855 million to \$659 million, puts the total below the 1977 figure of \$686 million.

"The breeder program, as well as other long-term energy programs such as fusion power, is very costly to conduct now and produces benefits only after many years," Acting Administrator Robert Fri said. "The President's energy priority, as reflected in the revision of ERDA's 1978 budget request, stressed conservation and nearer term supply technologies. These priorities suggest that past plans for expansion of the breeder program may no longer be viable."

Most of the base R&D work on the breeder program will continue including design activity.

Increases totaling \$160 million in Conservation Program authority includes \$33 million for Electric Energy Systems and Energy Storage; \$55 million for End-Use Conservation in Industry, Buildings and Community Systems, and Transportation; and \$24 million for Improved Conversion Efficiency. Total Conservation authority for 1977 was \$161 million.

Funds totaling \$40 million are also included for implementation of the Electric and Hybrid Vehicle Demonstration Act and \$8 million for continuation of a pilot Energy Extension Program to be initiated in 1977.

The Fossil Energy Program was increased for FY 78 to \$639.9 million compared to \$598.3 proposed by the Ford Administration. That compares with the

## Fun & Games

*Upcoming events* — Next orienteering competition will again be held in Tome, Sunday, May 1. For cyclists, the fifth annual Tour of the Rio Grande Valley is set for Sunday, April 24. Runners who happen to be in the area may want to enter the San Francisco Bay to Breakers race on Sunday, May 15. Last year the 8-miler attracted 8000 entrants. Not to be confused with the Bay to Breakers race is the Thoreau, New Mexico, Merchants Bank Mesa Run on May 22. The whole town turns out for this 13-miler, and both spectators applaud vigorously. *Lab News* office has entry forms and other information on these events.

1977 figure of \$483 million.

About \$23 million of the fossil increase will go into coal R&D for near term payoff items including small industrial gasifiers, small fluidized bed combustion units and intermediate sized low-Btu gas projects. About \$18 million is for enhanced oil and gas recovery work.

"Budget changes (by the Carter Administration) obviously do not change the total budget very much but rather make a very substantial shift in the neighborhood of a quarter of a billion dollars from the longer-term, higher risk energy R&D programs proposed in the January 17th version (by the Ford Administration) of the budget and in the nearer term earlier payoff conservation and supply technologies as proposed in this budget," Mr. Fri said.

While solar budget authority was unchanged, \$45 million was switched within the program to permit an additional 1,300 demonstration units to be initiated to reach a new total of about 240 commercial and about 4,000 residential units. Funding for the longer term 10 Mwe Central Receiver Pilot was reduced from \$65 million to \$10 million to stretch out project development activities.

Also reflecting a slowing down of long-term programs is an \$80 million cut by the Carter Administration in fusion power development. Emphasis is on a few key test reactors, particularly the tokamak fusion test reactor at Princeton. The revised total is still slightly higher than the 1977 figure.

Other programs show adjustments up or down but no substantial changes.

\* \* \*

President Carter sent to Congress on March 1 his proposal to create a Department of Energy. The proposed bill would abolish ERDA, the Federal Energy Administration, and the Federal Power Commission, and consolidate these independent agencies in the new department.

Parts of several other agencies would also be included in a move to place in one Cabinet department all the major elements necessary to direct a coordinated national energy effort.

There would be about 20,000 employees and an FY 1978 budget of about \$10.6 billion.

### *Scope and Authority*

In his letter transmitting the bill to Congress, President Carter cautioned that "even with a new Department of Energy, problems of interdepartmental coordination will remain, since virtually all government activity affects energy to some extent. Establishing this department, however, will give us one government body with sufficient scope and authority to do the massive job that remains to be done."

The President has said he will send to Congress about April 20 a comprehensive energy policy dealing with conservation and fuel supplies.

## Still Smoking?

A Stop Smoking Clinic will be conducted by and at St. Joseph's Hospital on five Tuesdays from 7 to 9 p.m. beginning April 12. Advance registration is mandatory; call 842-0555. Fee is \$25.



ANDREW ORAVECZ, violinist

## Andy Makes Concerted Effort

Andy Oravec (9657) was ten when he found his sister's violin tucked away in the attic. He promptly tucked it under his chin instead and started sawing away. He's been at it ever since.

"My father had been disappointed when Sis gave it up," Andy remembers. "So when I managed to coax a few bearable tones out of it, he decided I had some talent, or at least a pretty good ear for pitch. Off I went for lessons in fiddle playing — Dad liked Western music and polkas from the old country."

That phase lasted only a couple of years (though Andy later helped support himself in college with stints in Western bands). Then came girls, then disillusionment — at 14! — then the violin again, this time for real. "I learned to read notes, and I discovered the challenge of classical music," Andy says. "At the same time I discovered the challenge of being a lover of classical music in a tiny Pennsylvania coal mining town. 'Sissy' was one of the more polite epithets."

But Andy stayed with it through school and into the Air Force. In 1961 he accepted a job with Sandia and arrived in Albuquerque with his violin under his arm. "I didn't even have a room yet when I stopped in at May Music Company. 'I don't suppose you have an orchestra out here,' I said to the woman behind the counter. 'We most certainly do,' she replied.

"That's how I ended up auditioning three weeks later with what was then the Albuquerque Civic Symphony. I was accepted, and I've been with the Orchestra steadily ever since."

Andy continues to be fascinated by the challenge of difficult musical passages, traditional and modern. "Getting them just exactly right — right emotionally as well as right technically — and then sensing the audience's enthusiasm: that's a tremendous thrill. And that's what all the time and effort is about."

(See Andy live at the New Mexico Symphony Orchestra concert on April 15 or 16 at Popejoy Hall.)

# MILEPOSTS

## LAB NEWS

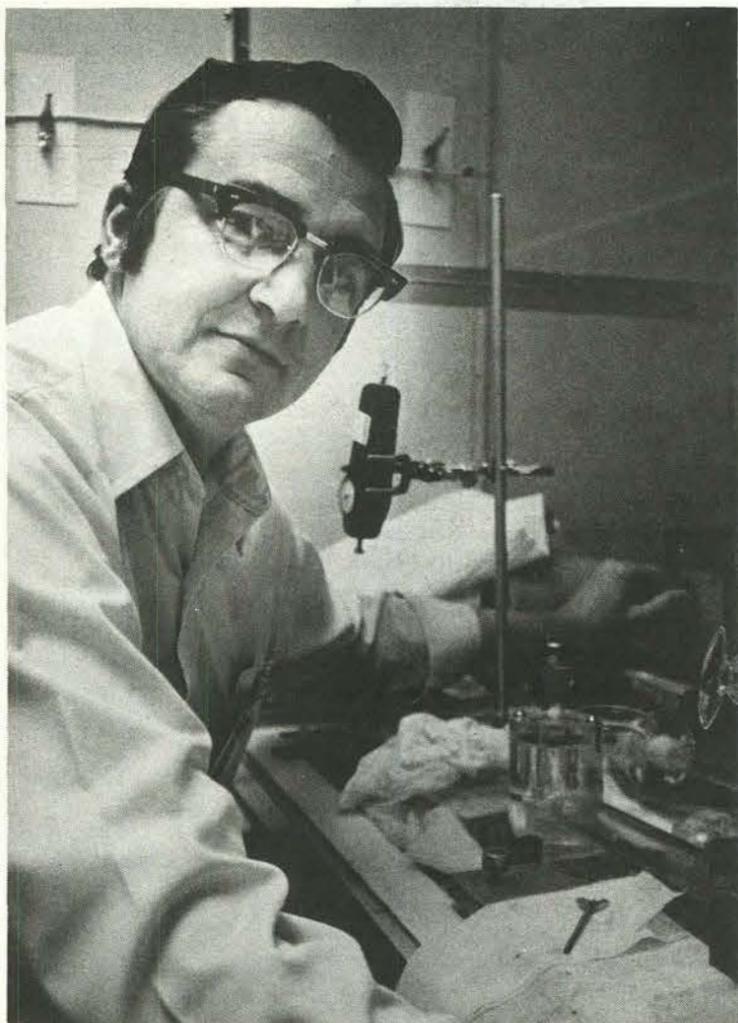
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John Crawford - 2350 15



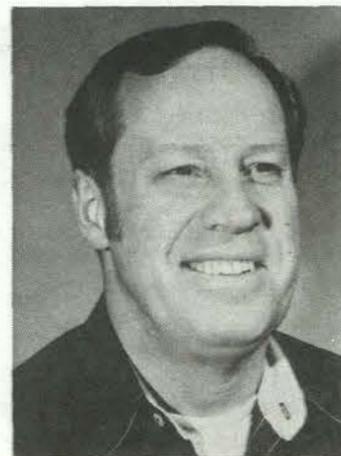
Tom Crawley - 9481 25



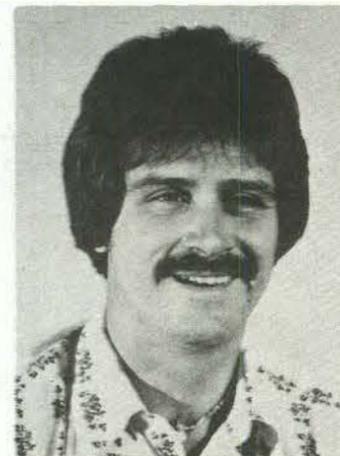
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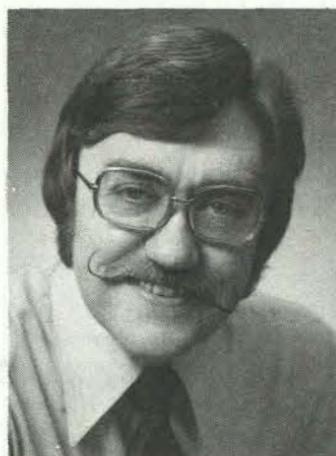
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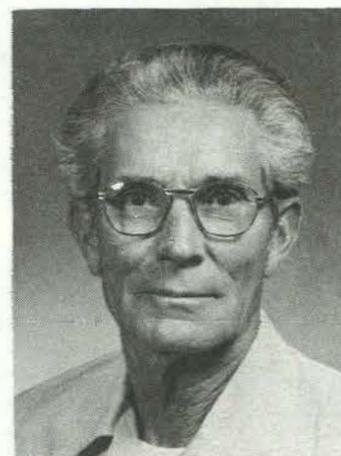
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Chuck Smith - 1125 10



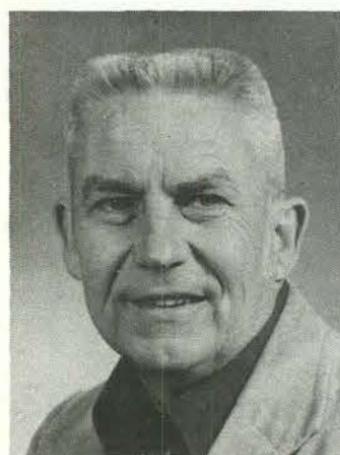
Jim Muir - 8181 15



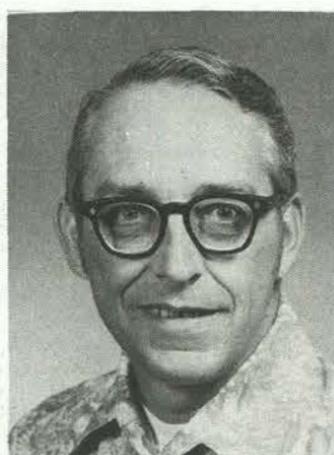
Thomas Brooks - 9742 25



Alton Anderson - 2355 25



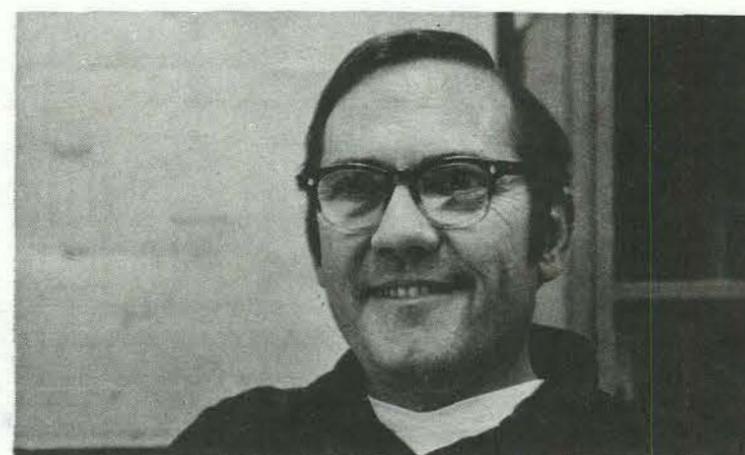
Edward Brass - 2622 20



Richard Doyle - 3442 20



Jesse Pfrimmer - 9524 10



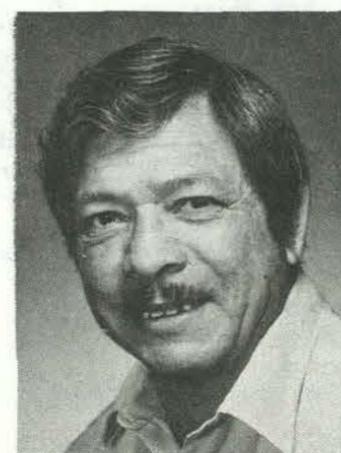
Bill Self - 2553 10



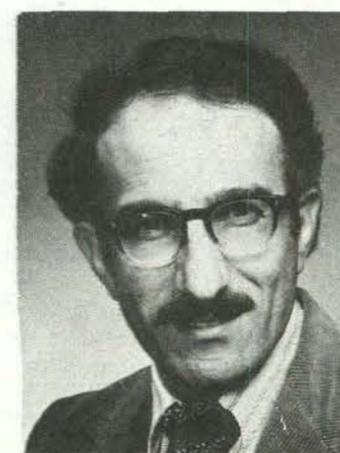
Janice Sharp - 9753 20



Wilma Ash - 3253 20



Eusebio Montano - 9712 25



George Samara - 5130 15

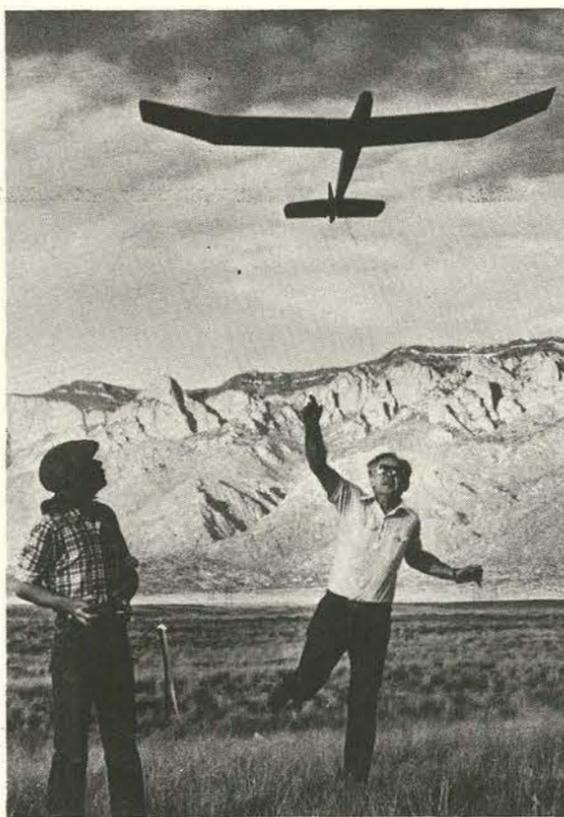


TORGV — Sandia's many bike riders (and Laura Garcia of 1324 is one of them) won't want to miss the fifth annual Tour of the Rio Grande Valley, to be held on Sunday April 24. The leisurely tour will attract more than 200 riders, heads south on little-travelled roads to the Belen area, schedules many rest/lunch stops, and even provides a "sag wagon" to retrieve the faltering cyclist. Distance: either 50 or 100 miles, according to taste. Entry forms: Lab News office.

## sandia PEOPLE Report



"GO FLY A KITE" is advice Mac McHarney (3155) took literally several years ago. He's built and flown hundreds of his own designs — from 20 ft. monsters to small fighting kites. Mac says the hobby is "satisfying and relaxing."



PETE PALMER (5214) with his son Christopher, 14, has emerged from winter hibernation with a new radio-controlled glider — three months of evenings and weekends spent in construction. After launch, the craft is guided into spirals of rising air currents for flights of up to an hour, altitude practically out of sight. Pete enjoys both building and flying, looks forward to warm days and thermals.



BRYAN ROBERTS, an Aussie on leave from the University of Sydney working in Parachute Systems Division 1332, waits for a tossed boomerang to return. An aeroelasticity expert, he is still fascinated with "the way the bloomin' things work. They're great sport for kids and blokes alike." Bryan has a closet full of boomerangs, can't manage to throw any away.

# Carlsbad Residents Get The Word

About 150 Carlsbad residents gathered last week at a meeting sponsored by the city's Chamber of Commerce to hear the story of the Waste Isolation Pilot Plant (WIPP). For Wendell Weart, manager of Waste Management Systems Department 1140 and featured speaker for the occasion, it was another opportunity to describe the proposed storage of low level radioactive waste in a bedded salt formation some 600 m beneath the surface at a site 48 km east of Carlsbad.

For the most part, the audience was receptive to the project. WIPP will be about a \$300 million boost for the economy of the community. This includes land acquisition, design costs, construction, utilities, rights-of-way, etc. Once built, WIPP will employ about 350 persons.

Wendell and members of his staff — Clyde Walker, Les Hill and Leo Scully — have presented about 100 talks to civic groups in Albuquerque and the southeast part of the state — Carlsbad, Artesia, Roswell and Hobbs.

"We have four tasks in the WIPP project," Wendell says. "Site selection and

characterization, conceptual design of the plant, drafting an environmental impact statement and public information. Lately, public information activities are demanding more and more of our time."

That same day, Wendell had spoken at a breakfast meeting and appeared on television. The day before, he had been on a TV program in Roswell. At most of the meetings, Del Davis, director of ERDA's Nuclear Materials and Waste Management Division ALO, is also a featured speaker.

"The concerns we encounter are due to the lack of knowledge that people have regarding the real hazards of radioactive waste and the safeguards that are used to prevent these risks," Wendell says. "Carlsbad is a town of about 27,000 people. Largest local industry is potash mining. These people know about the underground salt beds in the area. They understand how salt is an ideal medium for long term storage of nuclear waste. The questions we get reflect some people's fear of the word 'radioactive' — we continually stress in our talks that safety is our prime concern. We explain the nature of the nuclear waste and

how it will be handled, and assure them that there is no way it can blow up. Their fears disappear, or at least are put to rest for the moment."

Although the decision to locate the WIPP near Carlsbad has not been made, the site appears satisfactory. Wendell's group has completed preliminary site characterization. Hydrological and meteorological studies will continue, but the salt beds between 650 and 800 m beneath the surface appear to be ideal for the WIPP operation. They have been geologically stable for more than 200 million years and will likely remain so for a few million more years.

This month the conceptual design of the plant and the environmental impact statement will be completed and sent to ERDA for review. Before any decisions are made to proceed, public meetings will be held to review the data.

If all approvals are received, construction of the pilot plant will start in mid-1979. Operation of the plant will start in late 1983.

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#### RULES

1. Limit 20 words.
2. One ad per issue per category.
3. Submit in writing. No phone-ins.
4. Use home telephone numbers.
5. For active and retired Sandians and ERDA employees.
6. No commercial ads, please.
7. Include name and organization.
8. Housing listed here for rent or sale is available for occupancy without regard to race, creed, color, or national origin.

### MISCELLANEOUS

- STEREO RECEIVER, solid state, turntable, speakers. \$85, Stuart, 265-7315.
- STEREO, Motorola solid state, 3 yrs. old, built-in speakers, \$25 or best offer. Headrick, 299-8159 after 7.
- MANICURE KIT, P. Shine, used 4 times, paid \$13 — sell \$8. Stearns, 281-3872.
- PIANO, upright, walnut, \$500. DeVargas, 296-5841 after 5.
- POOL, COLECO, above ground, filter, ladder, footbath, \$75; TV, RCA, console, 21", B/W; stereo phonograph, AM/FM stereo radio, Bailey, 292-3227.
- SOFA & LOVESEAT, white & gold predominant colors, yr. old, Orner, 298-7280.
- CASSETTE PLAYER - RECORDER, Sears, built-in mike, solid state, uses batteries or AC, used twice, \$30, Shunny, 265-1620.
- GAS RANGE W/BROILER, Rheem 36", \$125; sofa, den, \$35; range hood, 36", sink, kitchen, \$20, Garcia, 256-7606.
- CB RADIOS, Hy-Gain V, 40 channel-SSB mobile unit, \$246 (ret \$360); Hy-Gain VIII, 40 channel-SSB base sta, \$308 (ret \$450); brand new, factory warranty, Tucker, 877-1140.
- TEACART SERVER, pecan, slate top, drop lf sides, \$100, Caskey, 294-3218.
- EXERCYCLE, Sears, like new, \$40; ham receiver, Heath, HR10B, \$50; typewriter, Royal, manual, \$20; adding machine, electric, \$10; Miller, 298-3534.
- MECHANIC BOOKS, Ford, 1972, Seidner, 298-4685.
- CLARINET, Bundy, & stand, \$75; refrigerator, Norge, 17 c. ft., \$50; clothes line poles, \$15; mattress, twin size, springs, \$15, Newell, 299-3236.
- SHELL, Topkat, fiberglass, for small pickup, \$175, Leslie, 294-6770.
- WASHING MACHINE, Kenmore, 3-cycle, \$100; card table, poker, 8-sided, grn. covering, folding legs, \$30, McKay, 256-3911.

- CHINA, Haviland, 112 pcs., rare blue pattern, from France, 100 yrs. in family, Jackson, 296-1307.
- CAMPER for compact truck, sleeps 4, sink, stove, ice-box, jacks, intercom, 1050 lbs, \$700, Martin, 299-6768.
- TIRE, new, sz. J-78 x 15, steel belt, \$20, Sheaffer, 255-9473.
- GUN, Smith & Wesson, Model 19, 6" barrel, \$200; camera, Nikkor-Q, Auto 1:2.8 F-135 mm lens, \$150, Martinez, 262-0839.
- CARPET, gold, tweed, nylon, shag, approx. 50 yds., padding available, Meyer, 296-9066.
- GUITAR, \$60, Barnaby, 265-4353.
- RADIATOR, 67 Camaro, \$15; differential, Camaro, complete, \$35; door & window hardware for 1929-32 Plymouth, take all \$35, Pfeffer, 299-4650.
- DINING TABLE & CHAIRS, modern, walnut, \$150, Stirbis, 299-5363.
- CAMPER SHELL for Courier, Luv, Datsun, insulated, lights, \$225; baby chicks, .50 & up, Lackey, 898-6638.
- ROCKING CHAIR, Ethan Allen, extra large, \$60; bedspread, king, pink, quilted, \$10; mirror, dresser 3 x 4, \$6, McBride, 299-4347.
- CATS, adult male Siamese, adult female Burmese, male Siamese/Burmese, 10 mo. old, Stevens, 867-5713.
- BIKE, girls 10 speed, 18" frame, 26" wheels, \$49, Horton, 298-4449.
- GARBAGE BAGS, \$3.25 per box; wall furnace, 30,000 B.T.U., \$20, hair dryer, hood-type, \$6.00, Koletar, 255-4751.
- CARPET, wool, w/pad, gray sculpture, 12 x 19, \$50; golf bag, Hogan, white, \$12; Titleist Sandwedge, \$10, Adams, 881-6836.
- CLOTHES DRYER, Whirlpool, gas, white, almost new, Benjamin, 293-5578.
- DRIVER, Wilson Staff, regular length, wt & stiffness, Holmes, 292-0898.
- GOLF CLUBS, Golf Tech, Simmons International, 1, 3, 4, 5 woods, pro line D 2 regular shafts, \$50, Kaiser, 296-5215.
- STOVE, Wards, electric, ceramic top, avocado, \$150, Manhart, 268-3017.
- DOUBLE OVEN, electric; range, counter top, exhaust hood, with fan, light copper tone, \$25 takes all, Fisher, 298-0526.
- DISHWASHER, Hotpoint, hvy duty, under-counter, harvest gold, \$50, Shiveley, 867-5439.
- TIRES, 2, GR-70 x 15, steel belted radial, less than 5,000, on wheels with 5 holes; motor, 1 HP electric, 110-220 volts, Bullock, 296-3487.
- TV, Motorola, B/W, 19", portable, UHF loop & rabbit ears, 3 yrs. old, \$75 or best offer, Orear, 256-1941.
- TABLE & CHAIRS, 30" x 40" w/8" leaf, woodgrain formica top, chairs are brown padded vinyl, \$25, Chinn, 296-5172.

- GOATS, registered nubian dairy, all kids sired by star buck, Shank, 877-4497.
- ALFALFA HAY, \$2.50 bale, Shock, 877-3728 after 6.
- COCKER SPANIEL, male 6 mos. old, blond, papers, shots, accessories, \$125, Manley, 293-1293.
- CAMPER SHELL, 2' high, alum., for long wide bed, Patterson, 877-6037.
- LAWN MOWER, manual, w/catcher, 16" reel, reconditioned, \$20, Swearingen, 255-5881.
- WASHER & DRYER, Kenmore - Sears, svc contract maintained, cycles include delicate, w/w, regular, white, \$60 ea., both for \$100, Atkins, 298-5762.
- MUFFLER & TAILPIPE for a '75 Chev pickup, make offer, Baca, 293-9710.
- TIRE CHAINS, 7.50 x 16, \$25; dinette set, formica top, with 4 swivel chairs, \$60; wagon, \$8; bicycle, \$25, Snow, 296-5148.
- CATALYTIC HEATER, Coleman, 3000-5000 BTU, white gas, \$20, Kramer, 898-7149.
- COFFEE TABLE, 56" x 24", inlaid marble top, \$50, Fasano, 298-2954.
- NIKON FT, 4 lenses, accessories, filters, cases, tripod, \$625, Parks, 293-2788.
- TV, JC Penney, color, model 2983, 17", sm console, Elich, 881-0041.
- STEREO, Panasonic, model RE 7670, Garrard X 10 changer, bookcase speakers, \$90; football shoes, Adidas Superlight, sz 5, \$6, Tucker, 881-0247.
- GOLF CLUBS, Walter Hagen, 9 irons, putter, \$55; Patty Berg ladies 4 irons, putter, \$25; Wilson cart bags, Whitham, 836-1216.

### TRANSPORTATION

- '73 GRAN TORINO WAGON, factory towing option, PS/PB, air, luggage rack, AM/FM, 41,000 mi, Wetherholt, 299-5736.
- '75 DATSUN 280Z, air, vinyl top, new steel belts, AM/FM, 15,000 mi; '72 Olds Toronado, all power, AM/FM stereo, cruise control, orig. owner, Muller, 299-1012.
- '65 VW BUG, custom, 1300 cc, rebuilt eng, sun roof, mags, headers & custom interior, swt pea grn, \$1200, Jarrell, 266-7444.
- '75 MONZA TOWNE COUPE, 23,000 mi, 4 cyl, 3 spd, AM/FM, 8 trk stereo, \$2700 or best offer, Rand, 293-8875.
- '76 MONTE CARLO, sunroof, AM/FM cassette, PS, PB, AC, cruise control, tilt steering wheel, 10,000 mi, Finley, 265-5396.
- '68 CHEVY CAPRICE, 4 dr, hd top, 327 CID, new brakes, new upholstery, new paint and vinyl top, \$1050, Martin, 869-2049.

- '67 CAMARO, 1/4 mile dragster, completely equipped, can be street legal, \$1900 firm, Pfeffer, 299-4650.
- '73 FORD 1/2 TON PICKUP, 390 V-8, all power & air, equalizer hitch, brake control, small camper shell, Russell, 298-4949.
- '74 250 YZ YAMAHA DIRT BIKE, forward mounted shocks, make offer, Mayberry, 881-8214.
- '74 SUZUKI 250, 2000 mi, \$550; '73 Suzuki 500, 9000 mi, rack, fairing, \$650, Tobyas, 877-0354.
- '70 HONDA SL 350, 9200 mi., \$400, Mendel, 265-3840.
- '74 BUICK ESTATE WAGON, AM/FM, vinyl, luggage rack, tilt steering, elect. rear window & door, Seidner, 298-4685.
- '73 VW CAMPER, Garcia, 344-4688.
- DIRT BIKES: 125 cc Puch \$275; '76 Yamaha 250 YZ, monoshock air forks, \$895; '74 Husky 250 cc, \$700, Lassiter, 298-2461.
- '72 VW FASTBACK, automatic, new tires & battery, 42,000 mi.; '76 Monza Coupe, vinyl top, automatic, 8000 mi., Haycroft, 299-3220.
- '71 SUZUKI, T-250, Hustler, \$270, Young, 842-1938.
- '76 HYDROSWIFT BOAT, 20', open bow, deep V hull, 233 Mercruiser, tandem axle trailer, towing cover, vinyl top, Wilson, 299-1480.
- BICYCLE, 20", girls, \$20, Lochtefeld, 296-1326.
- '75 FORD F-250, 1/2 ton custom supercab, PS, PB, AC, 4-spd, \$4700, Ross, 296-9794.
- '72 PINTO, low mileage, \$1000, McIlroy, 299-4977.
- '71 MAVERICK GRABBER, 2 dr., 8 cyl., AT, PS, AC, 63,950 mi., \$1,100, Foesch, 881-5350 after 4 weekdays.
- BICYCLES, two 16" children's, 1 boys & 1 girls, make offer, Drumheller, 296-1023.
- '72 VEGA, radio, heater, 4-speed, rebuilt engine, \$650 or best offer, Dees, 898-8049.
- HONDA, '74, 350-Four, padded sissy bar & crash bar, low mileage, \$950, Montoya, 265-3274 or 881-6898.
- BICYCLE, Schwinn Stingray, 20", 3 speed, hand brakes, puncture-proof tires, Goens, 281-5419.

### REAL ESTATE

- PLACITAS, 12 acres for \$13,000, terms negotiable, Jellison, 296-9155.
- 5 BEDROOMS, L-shaped, walled front patio, large backyard, 1 1/2 baths, two furnaces, fireplace, carpeted, SW style, near Sunport Golf Course, selling price \$39,950, call for appointment, Straba, 242-3031.
- HOUSE, 4 bdrm, carpeted, NE heights, Lin, 296-1911.
- OPEN HOUSE, by owner, 1-5 tomorrow & Sun., 3 bedroom, 1 1/2 bath,

- open floorplan, 1900+ sq. ft., FHA \$42,950, make offer, Grandjean, 12309 Towner NE (1 blk S of Menaul, 2 E of Chelwood).
- 3 C-1 LOTS, 1100 block of Louisiana SE, west side, \$28,575 or best offer, 29% down, balance 5 yrs at 8%, Barrett, 9725 E 27 St., Independence, MO 64052.

### FOR RENT

- LAKE FRONT CABIN, Vallecito Lake, near Durango, 3 bedrooms, furnished, fireplace, hiking, fishing, horseback riding, reserve for vacation, Croll, 881-7235.
- 3 BEDROOM, 1 1/2 bath home in Ashcraft area, south of Winrock, available mid-June, tree & lawn care required, \$330 mo., Schwoebel, 298-4295.
- APARTMENT, 1 bedroom, unfurnished, utilities paid, walk-in closet, patio, laundry, \$180 mo., 541 Espinola SE, Aragon, 242-1651 or 293-3238

### WANTED

- HOME for Siamese cat, female, spayed, declawed, house-broken, Nielsen, 299-2919.
- IRRIGATION PUMP, 8" to fit in 14" casing, Jaramillo, 865-7081.
- BIKE, 10-spd, 19" frame, boys, Hall, 298-8617.
- COIN & STAMP COLLECTOR, need your knowledge & help in organizing recently inherited collection in exchange for duplicates, Murfin, 255-4332.
- ARKANSAS/TEXAS TECH FOOTBALL EXCURSION via Charter Luxury-Cruiser November 26, 1977. Tickets and hotel accommodations available. Reservations, Browning, 268-8260.
- CAMPER SHELL, long wide bed, lightweight, not insulated or paneled, Schamaun, 298-5192.
- CARSEAT, infant, Peterson or similar type, Santana, 294-0536.
- UTILITY TRAILER, small, to rent, to haul luggage, prefer two wheel type, Chavez, 298-0674.
- UTILITY TRAILER, 2-wheel, strong, light; black 15" rim, 6 hole, for Chevy pickup. Hawkinson, 281-5239 after 4/14.
- H.O. MODEL TRAINS and other sizes, Roth, 1-864-4080.

### LOST AND FOUND

- LOST — Round silver button; award tie chain with shield & diamond clip - "WE"; Seiko ladies' watch, yellow-gold with numbered face.
- FOUND — Screw-type bird earring with turquoise chips; social security card (J. R. Northrup).
- LOST AND FOUND, Bldg. 832, 4-1657.

FRIDAY	SATURDAY
8 — HAPPY HOUR HAM/SHRIMP CREOLE BUFFET Adults \$3.25 Under 12 1.92 COUNTRYMEN	9 — EASTER EGG ROLL AND HUNT 10 a.m. Members Only
15 — HAPPY HOUR ROAST BEEF BUFFET Adults \$3.25 Under 12 1.92 SPINNING WHEEL	16 — CASINO NIGHT 7:30 - Midnight Gambol and Gamble UP COUNTRY Mbrs \$1    Guests \$2

**EDUCATION** — can bring you rich rewards. That's certain — if you come out for Casino Night on the 16th, develop a foolproof method of breaking the bank, and head for Nevada. Master the arts of blackjack, craps, roulette, poker, chuck-a-luck, and wheel of fortune with strictly illegal tender: \$1 at the door (\$2 guests) buys you \$10,000 in Club-Cash.

**CAN** — a little shrimp of a Creole from Louisiana and a born ham find happiness together at the Club tonight? They can if they meet along your Alimentary Canal. (That's a new tryst on an old story, right?) After you're buffeted, sit back and relax or up and take notice while *The Countrymen* sit down and set up for your dancing pleasure-leisure.

**TAKE** — your chances about finding a seat next Friday if you arrive late. For it's *Spinning Wheel* night. They put on quite a show, and what you ought to show is up. While you're waiting for *Wheel's* 8:30 to 12:30 gig (don't plan to make the income tax deadline after the dance), scarf up some roast beef, baked potatoes with sour cream, and some sensational Sea-Club salads. (P.S. There's spinach souffle too, but you don't have to eat it in spite of what your mother would say.)



**YOU** — little ones out there: if you're six-or-under, get Mom or Dad or Both to bring you to the Club's Annual Easter Egg Roll and Hunt. Tell them they'll have a jolly old time watching you having fun finding eggs, rolling eggs, and winning prizes (everybody gets something). Door prizes and color cartoons too. It's free to members (tell your escorting parent to bring a membership card), and it's at 10 a.m. tomorrow.

**FROM** — outer to under, from beach to sports, all kinds of wear-wares will be modeled at the Sanado Club's Garden Party meeting next Tuesday at 1. Betty Reuscher reuschly consented to mastermind (mistressmind?) the whole thing. Reserve with Vicky Clark yesterday, if possible.

**COCKSURE** — of your kids' ability to swim the Rio Grande *lengthwise*? Great. Sign them up for advanced classes. Or maybe you're distraught when they wander near the goldfish bowl. Sign them up for beginning classes. The Club's Red Cross-approved swim instruction isn't guaranteed to make your child into a Spitzing image of an Olympic contender, but it will make them pretty Eely. Sign-up time is 9 to noon on the 23rd, parents.

**IGNORANCE** — about the inscrutable Orient can become advanced Sinophilia if you take the two-week Hong Kong tour coming up in November. (You do have to

**HOT FLASH** — Season swim tickets are now on sale in the Club's office.

be a speedy learner.) Ancient temples, sampans, ladder streets, age-old crafts commingle with modern elegance in Hong Kong. Bargains galore. \$879 the package.

**TO-KYO** — too. Two weeks there beginning July 26 will run you (walk you really) only \$899 from Albuquerque. Accommodations at the magnificent Otani Hotel in the heart of the metropolis. All kinds of tours available. And don't forget the free stopover privileges in Hawaii on the way home.



SPINNING WHEEL is at the Club next Friday.

**APPREHENSIVE** — about surviving in London (or Frankfurt or Amsterdam) on your own? Fear not. Before you depart on the Super Cheap (one of those ABC flights you've read about), Ed will have Educated you about transportation, lodging, and how to get your clothes clean in a country with no laundromats (just washaterias). Flights still open begin in mid-summer and end in September. From \$520.

**UNCERTAINTY** — about England still lingering? Or would you just like a nice, quiet, free slide show of London, Stonehenge, the Thames Valley, the South Coast, North Wales, Scotland (all accessible by train)? Either way, make it to Travelogue Night on the 20th when Bob Dougherty shows his slick slides at seven-thirty.

MORE INFO — 265-6791.

PAGE TWELVE  
LAB NEWS  
APRIL 8, 1977



**OLYMPIC CHAMP** Janet Ely is assistant diving coach for the Coronado Aquatics Club this year. Says head diving coach Eric Jones (5214, and himself former Pacific 8 diving champ and current National Junior Olympic Diving Chairman), "She's a great diver, of course, but she's also a fine teacher. We should have a fantastic year." Parents, if your kids are interested in competitive diving — or swimming — call CAC president Jack Gallagher for more information.